Historic, archived document

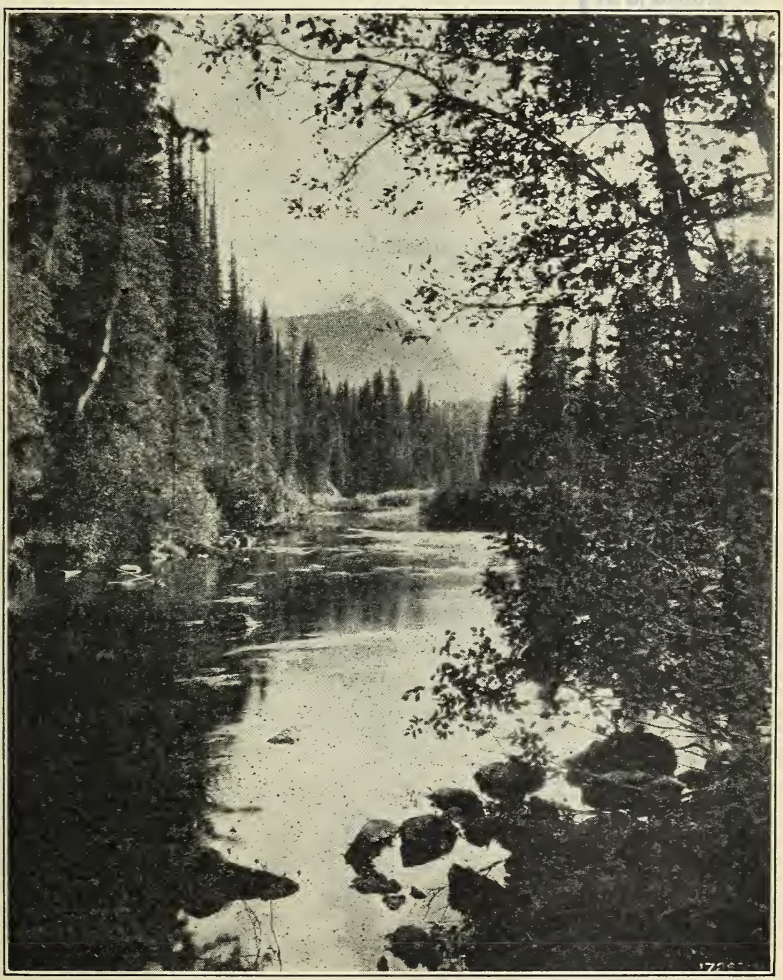
Do not assume content reflects current scientific knowledge, policies, or practices.

UNITED STATES DEPARTMENT OF AGRICULTURE
MISCELLANEOUS CIRCULAR No. 48

WASHINGTON, D. C. FEBRUARY, 1926

WHAT THE NATIONAL FORESTS MEAN TO MONTANA

By K. D. SWAN, Forest Examiner, Forest Service



F-172892

GLACIER CREEK, FLATHEAD NATIONAL FOREST

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1926

NATURAL resources of great value have fallen to Montana's share, and not the least of these is the wealth of her forests.

Most of the forested areas of Montana are more valuable for growing trees than for any other purpose, and the lumber industry of the State tells its own story in the number of men employed in the woods and mills, the development of industries directly dependent upon forest supplies, and other direct contributions to the general prosperity of the region.

The forests of the State have also other items to their credit:

On much of the land timber and forage are intermixed and grazing of cattle and sheep is a major activity.

The timbered slopes are primary reservoirs of power and fertility undergoing steady development.

The great mining centers of the State not only draw supplies but also derive power for transportation from adjacent forested areas.

Wild life is a forest resource of Montana, and one of the duties of forest officers is its protection under State game laws.

The conservation and development of the national forests of Montana therefore mean the perpetuation of its sobriquet—The Treasure State.

Washington, D. C. Issued February, 1926

WHAT THE NATIONAL FORESTS MEAN TO MONTANA

By K. D. SWAN, Forest Examiner, Forest Service

CONTENTS

	Page		Page
Montana richly endowed	1	Recreation	19
Montana natinal forests	2	Wild life	21
The timber resources of Montana	2	Protection from fire	23
The lumber industry	4	Forest planting	26
Grazing	7	Revenue from the national forests	27
Water power	11	Six rules for preventing fire in the forests	28
Irrigation	12		
Mining	16		

MONTANA RICHLY ENDOWED

On the seal of Montana are the words "Oro Y Plata" (gold and silver), but in the design above these words one finds, together with the miner's pick and shovel, a plow, forest trees, and falling waters, all emblematic of a rich natural endowment.

From the days when the trapper and trader took a heavy toll of furs from her woods to the present with its discoveries of oil, an increasing comprehension has come of the variety and extent of the resources of Montana, and the imagination may readily picture a future growth which will make still more appropriate her present sobriquet, "The Treasure State."

In Montana, as usually in new regions, the wealth which was most evident and easiest reached was exploited first. Trapping fur-bearing animals was the initial industry of the region. Later the bison, which at one time roamed the plains of central and eastern Montana, was ruthlessly slaughtered and in an incredibly short space of time almost exterminated. With the discovery of gold there sprang up mining camps, famous in the early history of the West. Soon after the influx of prospectors and miners the agricultural possibilities of the country were recognized. The value of the open grass ranges east of the Continental Divide was early realized, and a great stock-raising industry arose, which has made the Montana cowboy with his "chaps" a picturesque character of equal interest with the miner and the fur trader. Silver mining led to the discovery in 1883 of vast copper deposits in the vicinity of Butte, and Montana became the second copper-producing State in the Union. Finally, the true value of Montana's forests is becoming evident—a value which will be more and more realized with increasing industrial development and growth of population. The value of the forests lies not alone in the timber which may be cut, but also in the relation the timbered areas bear to streamflow and water power, and the pleasure and health they bring to those who visit them each year for rest and recreation.

MONTANA NATIONAL FORESTS

There are seventeen national forests in Montana. Practically all the State's timbered region east of the Continental Divide, and a large portion of that to the west, is included within their boundaries. Of 17,880,000 acres of publicly owned forests in Montana, 15,930,000 acres are in national forests, 560,000 acres belong to the State, 780,000 acres are Indian land, and a small amount is included in military reservations, Glacier National Park, and unadministered public domain. (See map, pages 14 and 15.)

Most of the forested areas of Montana are more valuable for growing trees than for any other purpose. In this respect they are unlike much of the forest that originally existed in the East and Middle West, which was cleared away to make farms. Only a very small part of the land now under cultivation in Montana had to be cleared. How to make the best use of the timberlands in the State did not involve the question of clearing them for agriculture, but rather the means to be employed in making them produce timber in greater quantity and better quality as a yearly crop in perpetuity.

With a growing population, and with expanding industries facing a constantly decreasing supply of timber, the necesssity for proper management and utilization of the great forested public domain is apparent. The national forests were set aside under an act of Congress passed in 1891. Since 1905 they have been administered by the Forest Service of the United States Department of Agriculture. The object aimed at in the administration of the national forests is the best use of all their resources under such regulations as will insure the permanency of these resources. Mature timber is for sale and may be cut in accordance with the principles of scientific forestry; where there is forage grazing of livestock is permitted; where water power is available its development under proper regulation is encouraged; where there are recreational opportunities they are open to the public; and where there are mineral deposits they may be freely exploited.

THE TIMBER RESOURCES OF MONTANA

It is estimated that four-fifths of the timber in Montana is west of the Continental Divide; here is the seat of the lumber industry, and here the large sawmills are located. The heavy growth of timber is due directly to the rainfall caused by moisture-laden winds that find their way inland from the Pacific Ocean.

Magnificent stands of western yellow pine (see fig. 1), the most widely distributed conifer of the West, grow in the Bitterroot, Blackfoot, Thompson, and Flathead River Valleys, and in much of the country tributary to the Kootenai River. It is estimated that about 46 per cent of the total supply of western larch in the United States is in Montana, practically all in the northwestern counties (fig. 2). Intermixed with western yellow pine and larch is Douglas fir, which stands high among the valuable timber trees of Montana. Although some western white pine grows here also, the quantity cut is very small compared with what is taken from the woods of northern Idaho and eastern Washington, and it can not be considered one of the important timber trees of the State.

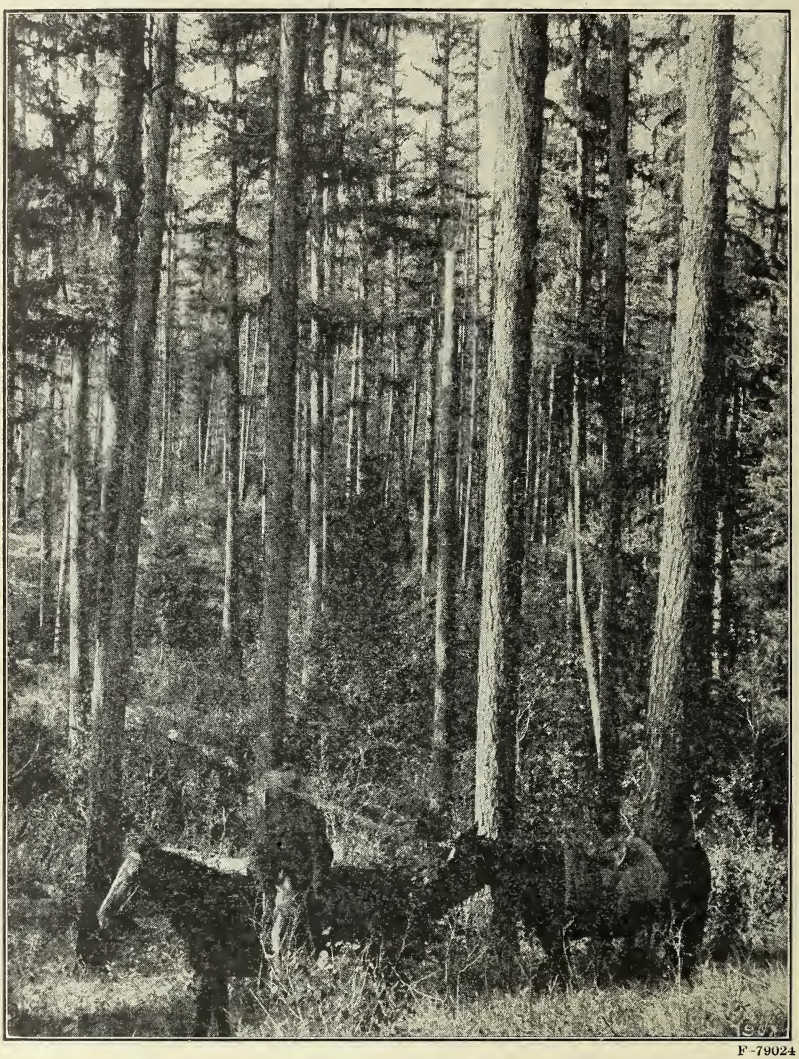
In contrast to the heavily wooded region west of the Divide is the country to the eastward, with forests confined largely to the mountains. At elevations of from 5,000 to 8,000 feet, extensive areas of lodgepole pine cover portions of the Continental Divide ranges and are a valuable source of mine timbers, poles, and ties for the mining industry and the railroads. This tree here assumes a much greater importance than west of the Divide, where, though widely distributed, it forms a smaller proportion of the total forest stand. Mixed with the lodgepole pine are Englemann spruce and alpine fir. The isolated ranges of the Little Belt and Crazy Mountains rise like islands from treeless bench lands and plains, and bear on their slopes and shoulders forests of pure lodgepole. At lower elevations yellow pine and Douglas fir are found, but the trees are of poorer quality and grow in more open stands than in the moister region to the westward.

F-86465

FIG. 1.—A forest of western yellow pine in the Bitterroot National Forest. This tree is the most important timber species in Montana

In the extreme eastern part of the State tree growth is very sparse, and is confined largely to isolated buttes and to the rim rocks and bluffs along streams. Such woods as these are utilized with a closeness unknown in places where timber is more plentiful. The Custer National Forest, which includes a group of hills lying between the Tongue and Powder Rivers and further east to the border of South Dakota, has a growth of western yellow pine timber which is a valuable resource for a wide expanse of treeless country. Here the rancher and stockman may obtain fuel wood and fence posts, and a number of small sawmills of the portable type supply lumber for building purposes. (Fig. 3.) It is not

unusual for a rancher to travel 50 miles for a load of boards or fuel. The aim of the Forest Service in the management of the Custer National Forest is to maintain a perpetual supply of timber for the benefit of the local people.



F-79024

FIG. 2.—It is estimated that about 46 per cent of all western larch grows in Montana

THE LUMBER INDUSTRY

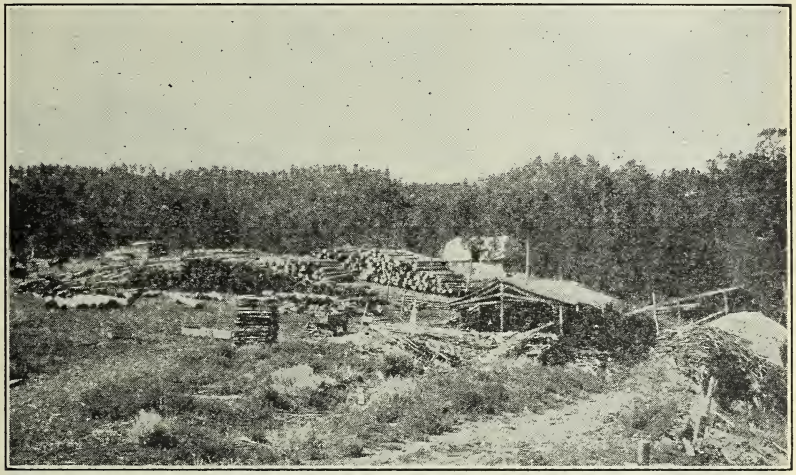
During 1924 the lumber mills of Montana manufactured 351,403,000 board feet of lumber. (Fig. 4.) Most of the finest lumber is produced in the western counties, but the areas of lodgepole pine and Engelmann spruce of the forests east of the Divide also yield lumber of fair quality, besides large quantities of poles, mine timbers, and ties. The small mills operating in central and

eastern Montana also cut much yellow pine and Douglas fir from the forests growing at elevations below the lodgepole pine areas.

The magnitude of the lumber industry and what it means to the State can easily be appreciated from the number of men employed in the woods and mills, the revenue paid to the railroads, the amount paid in taxes, and other factors contributing to the general prosperity of the region.

The largest sawmill is at Bonner. Near by is another large mill which is operated by electricity. Other large mills are located at Missoula, Somers, Warland, Libby, and Troy.

Although there are no paper mills operating in Montana, certain localities offer good opportunities for the successful establishment of a pulp and paper industry. Large areas on the Blackfeet and Flathead National Forests are composed chiefly of Engelmann spruce and white fir, species very well suited for pulpwood. The



F-156418

FIG. 3.—A small sawmill on the Custer National Forest in eastern Montana

lodgepole pine stands of the State may in the future offer possibilities for the further development of the pulp and paper industry.

With an increase in the population of Montana, the demand for lumber will also increase. Although a certain proportion of the special grades and sizes of lumber must be imported from other localities, the mills of the State should be able to furnish the greater part used. An adequate supply of material for these mills therefore becomes a big consideration.

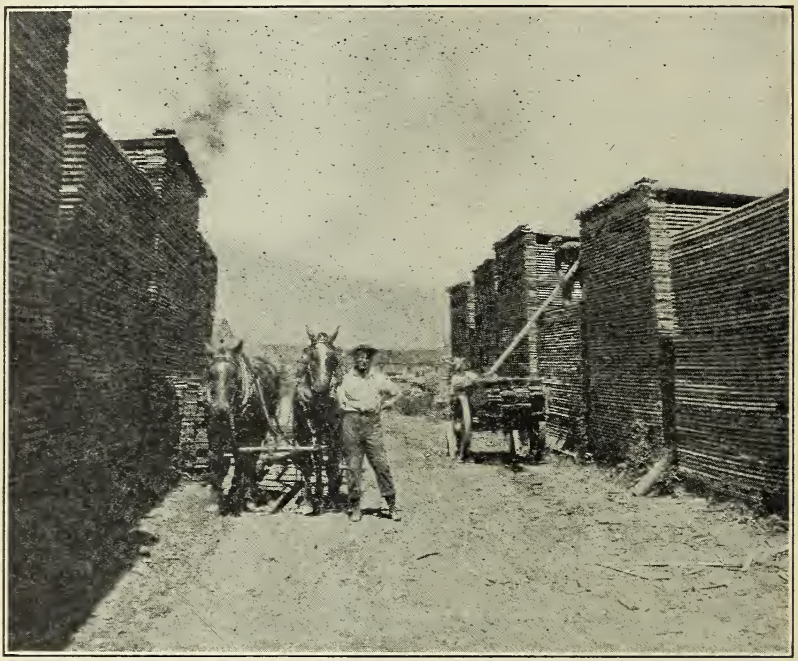
Of the total quantity of lumber cut in Montana during 1924, approximately 18 per cent came from national forest land. As the holdings of private companies are cut out, the timber of the national forests will be more and more sought after, and the percentage from this source, although varying from year to year, will increase in the long run.

NATIONAL FOREST TIMBER IS SOLD

The standing timber of the national forests which is mature and ready to cut is sold at fair prices (fig. 5). Anyone may buy timber,

but no one may hold it for speculative purposes or attempt to build up a monopoly through such purchase. In choosing timber which is to be sold, several points are taken into consideration. The aim of the Forest Service is to maintain a constant supply, available for the future as well as for the present. Much of the timber in the national forests of Montana is in a stage where growth is at a standstill, or the annual increase in volume is so slight as to be negligible. The mature trees should be cut so that the younger and more thrifty trees may have room to grow and seedlings may start.

The buyer of national-forest timber is required to observe certain rules of cutting, designed to insure a future forest. There must be young trees to replace those cut, and these trees must be given op-



F-156155

FIG. 4.—Lumber yard of a mill cutting national forest timber

portunity to survive by being protected from fire. Trees for future growth, especially thrifty young trees which will grow rapidly, and trees for protection of watersheds, to maintain forest cover and to produce seed must be left. Logging must be carried on in such a way as to damage as little as possible the young trees and seedlings that are left, and slash must be disposed of by piling and burning so as not to injure the remaining trees.

Many stands are composed of several species, some of more value than others. To make certain that the less valuable species will not predominate in the future forest is a problem which must be met. The methods used in handling timber sales aim directly at this result. The fewest possible restrictions are imposed upon purchasers of timber, however, and it is the desire of the Forest Service

to avoid red-tape methods which tend to delay and embarrass the purchaser. Homesteaders and farmers may obtain national-forest timber for their own use at the actual cost to the Government of handling the sale, no charge being made for the timber itself. Residents may take dead timber for personal use free of charge.

Experienced woodsmen estimate the quantity and quality of national-forest timber and its approximate value, as a basis for the price to be charged. All factors which affect the cost of lumbering, such as accessibility, and number and kind of improvements necessary, as well as the general market conditions, are taken into consideration. The prices set allow the purchaser opportunity for a fair profit. Bids are obtained through public advertisement, unless the amount is small enough to come within the limit which can

F-86471

FIG. 5.—A timber sale area on a national forest

be sold without such advertisement. No bid lower than the appraised value of the timber is considered.

Information concerning attractive logging chances and the conditions of sale is gladly given by the local forest officers.

GRAZING

The livestock industry is one of the oldest and most important activities in Montana. Not many years ago ample range was available to fatten vast herds of cattle, which were grazed on the plains and on the grassy slopes of the foothills. The public domain was used by those who were best able to assert their rights in a new country where settlers were few. Fences were scarce, and the use of the range was almost unrestricted. Friction between range users

was not unusual, and range wars were common. The cattleman looked askance at the sheepman, for sheep were considered a menace to cattle range. As the country became settled and other industries developed, the livestock owner found it increasingly hard to obtain sufficient range for his needs. Overgrazing was the result. The valuable forage plants gradually disappeared and plants which livestock do not eat came in to take their place. The carrying capacity of the range was thus greatly diminished.

With the creation of the national forests, a large amount of range which was intermixed with timber stands came under the administration of the Forest Service. Nearly all this range was already being used and much of it was undergoing depletion through overgrazing. Thus restoration and maintenance of the ranges at once became an object of Forest Service administration. In addition the task of developing unused and undergrazed ranges was undertaken.

F–29339–A

FIG. 6.—All resources of the national forests are for use. Fine grazing lands occur near the upper limits of timber growth

Better use of the range has gradually come into practice, and steady progress has been made toward really scientific management. The condition of the ranges has improved, and the forests are at the same time carrying more stock than under the old conditions. This has been accomplished with the cooperation of the stockmen. An equitable division of the range between sheepmen and cattlemen, and between individual owners, has come about, and range wars no longer occur. (Fig. 6.)

The first three essentials in scientific range management are (1) limitation of the grazing season to prevent injury through too early or too prolonged use; (2) regulation of the number and class of livestock to fit the carrying capacity; and (3) methods of handling to prevent concentration and overuse of portions of the range, with failure to utilize the range elsewhere. As these principles are worked out and applied, the ranges will be still further improved.

This is in striking contrast with what is happening on the public ranges outside the national forests. These outside ranges are gener-

ally at lower elevations than the national-forest ranges, and therefore constitute the natural feeding grounds for livestock at the beginning and end of the grazing period. In many places they adjoin and form an integral part of the national-forest ranges. This fact, together with a recognition of the value of regulation of range use, has led to a demand in many places to have outside ranges added to the national forests.

The aim of national-forest range administration is to build up and maintain at the highest point the productive capacity of the lands, and along with this to stabilize the livestock industry and promote settlement. Therefore the range is not allotted to the highest bidder, but preference is given to established users who own improved ranch property dependent on the range. The best use of the public ranges is in connection with farm and ranch development. Unless there is correlation of both national-forest ranges and public ranges outside the boundaries, with range development, the livestock industry can not realize the greatest measure of prosperity.

At present the national forests contain large areas of public range under stabilized use. With 11,250,000 acres of land available for grazing, they have about 13 per cent of the cattle and horses and 86 per cent of the sheep grazed in Montana, or about 160,000 cattle and horses, and 773,000 sheep. On much of the land timber and forage are intermixed. Grazing of such land, when properly regulated, does not conflict with the growing of tree crops, but on the contrary reduces the fire risk by lessening the inflammable material on the ground.

Although the timber resources of the national forests in Montana have been developed only to a limited degree, the grazing resources are almost wholly utilized. In fact, the demand for range on the forests is far greater than the capacity.

Cooperation between stockmen is supplanting the old idea of every man for himself. Very often a cattle range is assigned to a group of stockmen to be used in common by them. Each permittee turns on this range the number of animals his permit allows, and all the stock share the benefits of common watering and salting places and other range improvements. Cooperative herding and shipping is generally practiced under these conditions. Sheep range is divided into units of the right size for the individual bands. Although bands are usually confined to the individual range allotted to them, it is not uncommon for a number of small owners to pool their stock in a community band for the summer season.

In 1924 the average number of stock for each permittee was 69 cattle and horses and 1,594 sheep.

Before range can be most effectively utilized, it is necessary to know such things as the number and kind of animals a certain area can support and the season when grazing may be permitted without injury to the land or to forage plants. To this end extensive surveys are being made as fast as funds permit. These surveys are nothing more than detailed inventories of the grazing resources, carefully recorded in a systematic manner to form the basis of a management plan or scheme which aims to allow the maximum use consistent with the annual production of forage plants.

Range division lines are established to separate as far as possible ranges used by different classes of stock. Cattle and horses generally graze on the lower, more accessible grass ranges, whereas sheep are able to utilize large areas of timbered and semitimbered weed and browse range lying at the higher elevations. In some cases a range may be used in common by cattle and sheep, the sheep often feeding on the weeds which tend to crowd out the more palatable grasses relished by the cattle.

An interesting example of the solution of range problems is found in the new method of herding sheep which is now in use on national-forest ranges (fig. 7). Much of the antagonism to sheep in times past was due to the fact that severe damage was caused to the range by unnecessary trailing to and from bed grounds and close cropping of the forage. Investigations by the Forest Service have proved that this damage does not occur when sheep spread out over a consider-

F-30356-A

FIG. 7.—Open herding, illustrated in this picture, was first put into practice in Montana on the Helena National Forest

able area while feeding instead of being held in a close bunch. The herder allows the sheep to graze during the day at will, and instead of driving them to a bed ground at night, which causes unnecessary damage to forage, camps wherever night overtakes the band. Not only is feed conserved in this way, but the sheep do better than under the old system, because when they leave the bed ground they are on fresh feed and are better nourished. It is not uncommon for a progressive sheep herder to bring off lambs each weighing 5 to 10 pounds more than those of his neighbor herder who insists on close herding and driving sheep to the same bed ground many nights in succession.

The system of grazing on the national forests is directed by grazing experts—men who combine practical knowledge of the range livestock industry with scientific training. The local forest officers work under and with them to apply the methods which the experts prescribe. To open feeding grounds, roads and bridges are built, driveways located, and the remotest corners of the forests ransacked

in the search for new grazing areas. Meanwhile intensive study is being given to ways of increasing the forage yield and the effectiveness of its utilization.

WATER POWER

Lewis and Clark, journeying up the Missouri River in 1805, encountered the cataract which has since been known as the Great Falls of the Missouri. These falls, which were to the explorers a barrier against progress, are now harnessed and drive the turbines of a great power plant. Going upstream, in the space of a few miles one finds Rainbow and Black Eagle Falls developed in the same manner; and where the explorers saw only semiarid bench lands the prosperous city of Great Falls stands, with its immense elec-

F–150183

FIG. 8.—An undeveloped power site at the falls of the Kootenai River

trically operated smelter and zinc plant. These instances of the development of water power resources, great as they seem, only indicate the possibilities the future may hold. The State has about 1,000,000 primary horsepower in power sites, which have been or can be developed at a reasonable expense. (Fig. 8.) Montana now has an interconnected power system supplying one of the largest territories of any single system in the world.

The greatest power development is on the Missouri River. From the large Hebgen Reservoir near the head of the Madison River, an important tributary of the Missouri, to the Sheep Creek Rapids below Great Falls, there are a succession of 14 power sites, 8 of which are developed. If all 14 were developed to full capacity, engineers estimate that 313,000 horsepower could be produced. The

Clark Fork watershed has sites which would produce a total of over 620,000 horsepower. A power plant at Thompson Falls now delivers 60,000 horsepower. One of the largest sites, with a possibility of 205,000 horsepower, is on the Flathead River, below Polson. The Kootenai River has two potential power sites. A dam 480 feet high, which would develop about 100,000 horsepower, has been considered at the Big Horn Canyon on the Big Horn River about 30 miles above Hardin.

There are also power sites on the small rivers and creeks, which, although they supply but a small amount of water, have a great fall in a short distance. Many such sites are now developed for supplying power to mines and stamp mills, and for lighting purposes in small towns.

Electricity now hauls the trains of the Chicago, Milwaukee & St. Paul Railway across the Rockies and the Bitterroot Mountains. The Butte, Anaconda & Pacific Railroad, over which passes practically all the ore used at the great Anaconda smelter, has been operated by electricity for years. Electric power is used in the great mines around Butte, and has supplanted steam power in numerous other industries.

To provide a constant supply of water is one of the big problems of the water-power and irrigation engineer, and the solution depends to a large extent on the protection afforded by the forests at the heads of streams. A covering of trees keeps the winter snow from melting too quickly and prevents rapid evaporation of summer rains. The forest floor, with its duff and litter, acts as a sponge to hold water which seeps into it instead of running off the surface. Denuded areas, with little shade to protect the snows and with shallow soil lacking in vegetable duff to hold the moisture, are poor assurance for power developments involving the investment of millions of dollars.

Including within their boundaries great areas of mountainous country where streams have their sources, the national forests of the State are of great value to the water-power industry. In fact, the value of many of these forests lies chiefly in their use for watershed protection. Extensive areas of lodgepole-pine timber on such forests as the Absaroka, Beaverhead, and Madison are of special importance from this standpoint and are treated accordingly, so that the stability of industry dependent upon the rivers which they feed is assured.

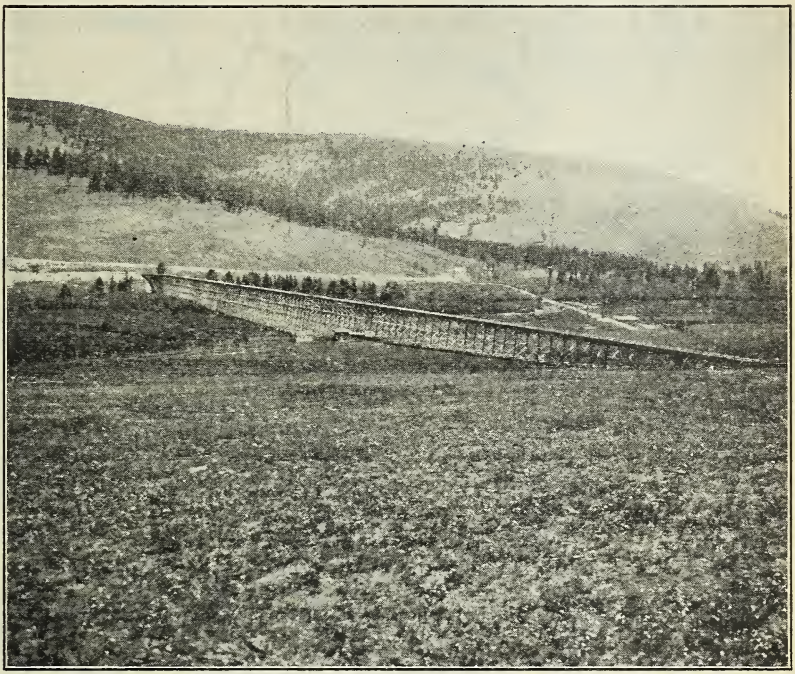
It must not be supposed, however, that the timber on such a forest must be left unused in order to maintain the value of the forest as a protective cover. By the application of practical forestry methods the great lodgepole forests can be made to yield many products, such as mine timbers, fence posts, and poles and ties, without the least reduction in their value as regulators of run-off. Protection from forest fire, that greatest of all denuding agents, must be assured, and is one of the chief safeguards the Forest Service aims to provide.

IRRIGATION

Irrigation antedates the discovery of gold in Montana. Father DeSmet, a Jesuit priest, introduced the art in the Bitterroot Valley in 1845, and a small irrigated settlement grew up around St. Mary's

Mission, where the present town of Stevensville now stands. The expansion of irrigation between 1860 and 1870 was simultaneous with that of agriculture, some of the men disappointed in gold mining turning to farming in the rich grass-covered valleys.

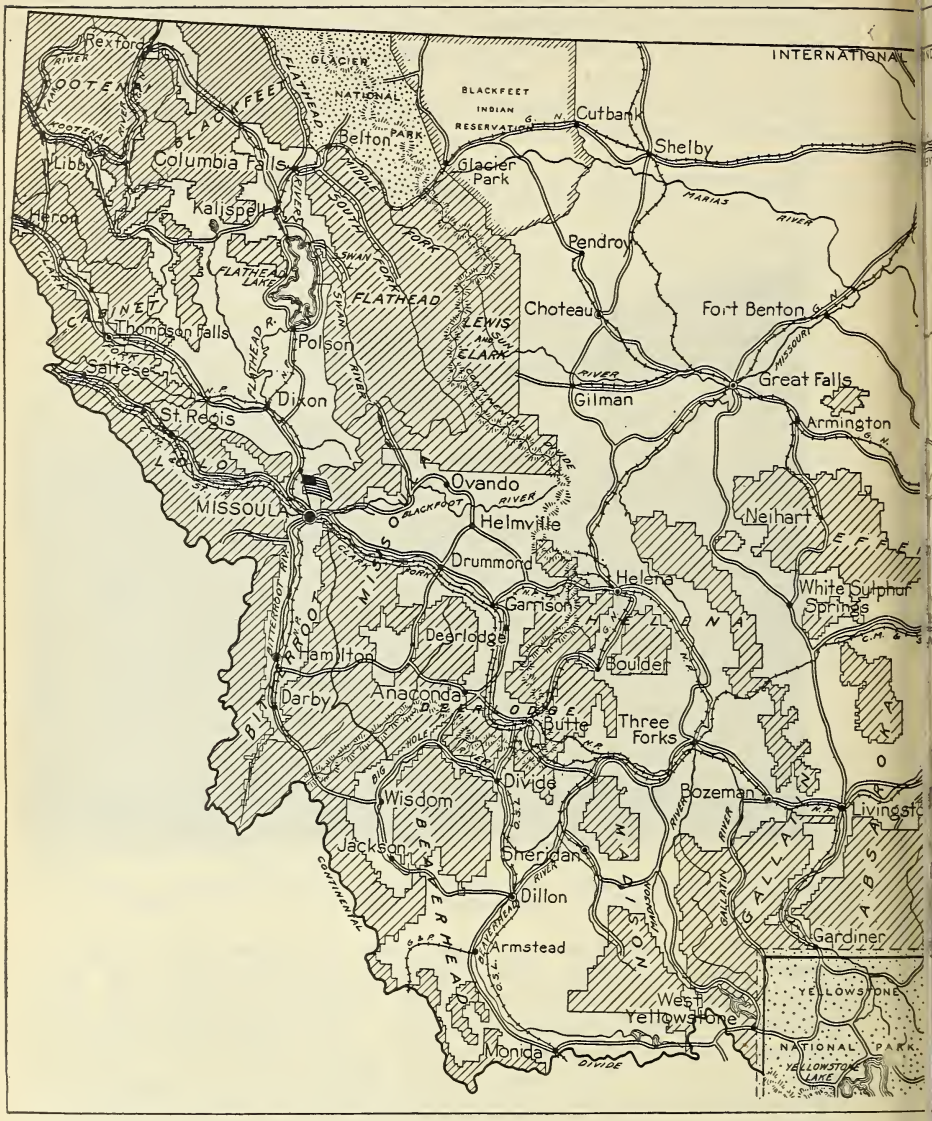
Montana now has nearly 3,000,000 acres of irrigated land. The irrigated area is being steadily enlarged by new projects, and by the extension and improvement of many older ones. In many localities cheap power makes it feasible to pump water to irrigate relatively high lands, and this form of irrigation is already in successful operation in a number of places. (Fig. 10.)

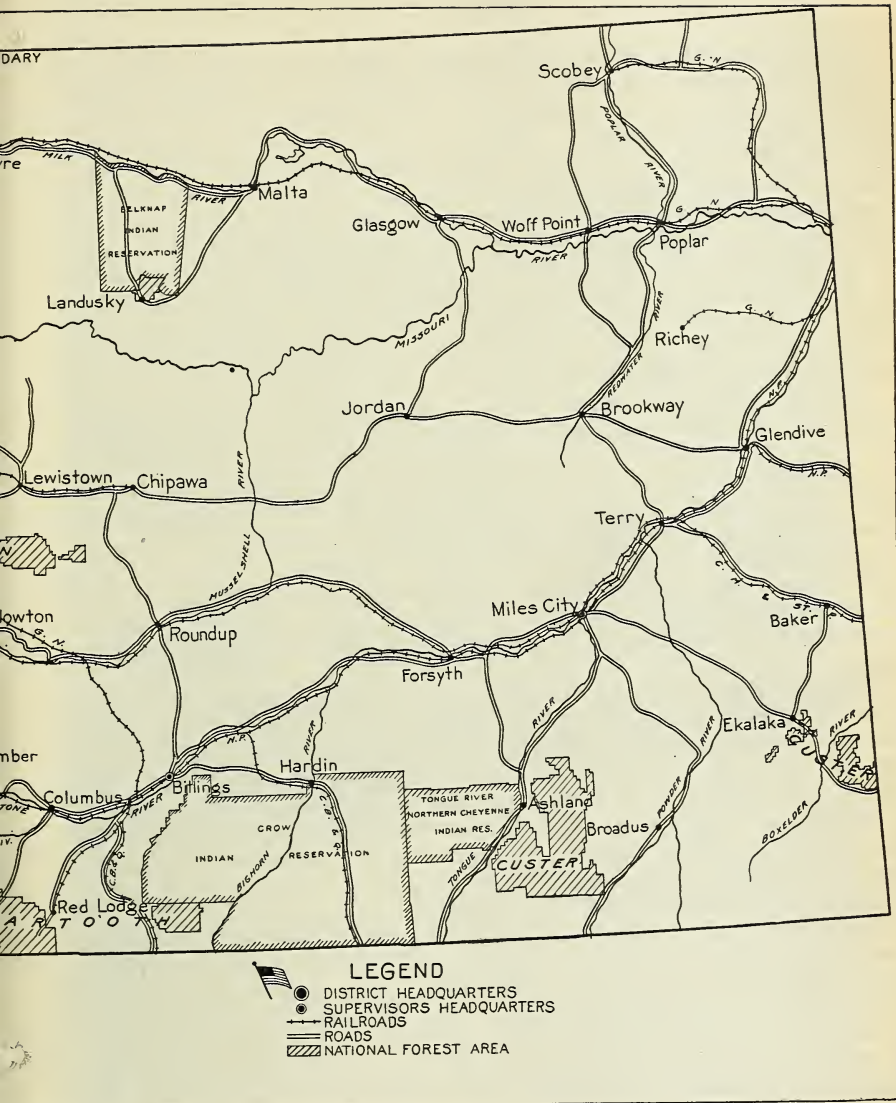


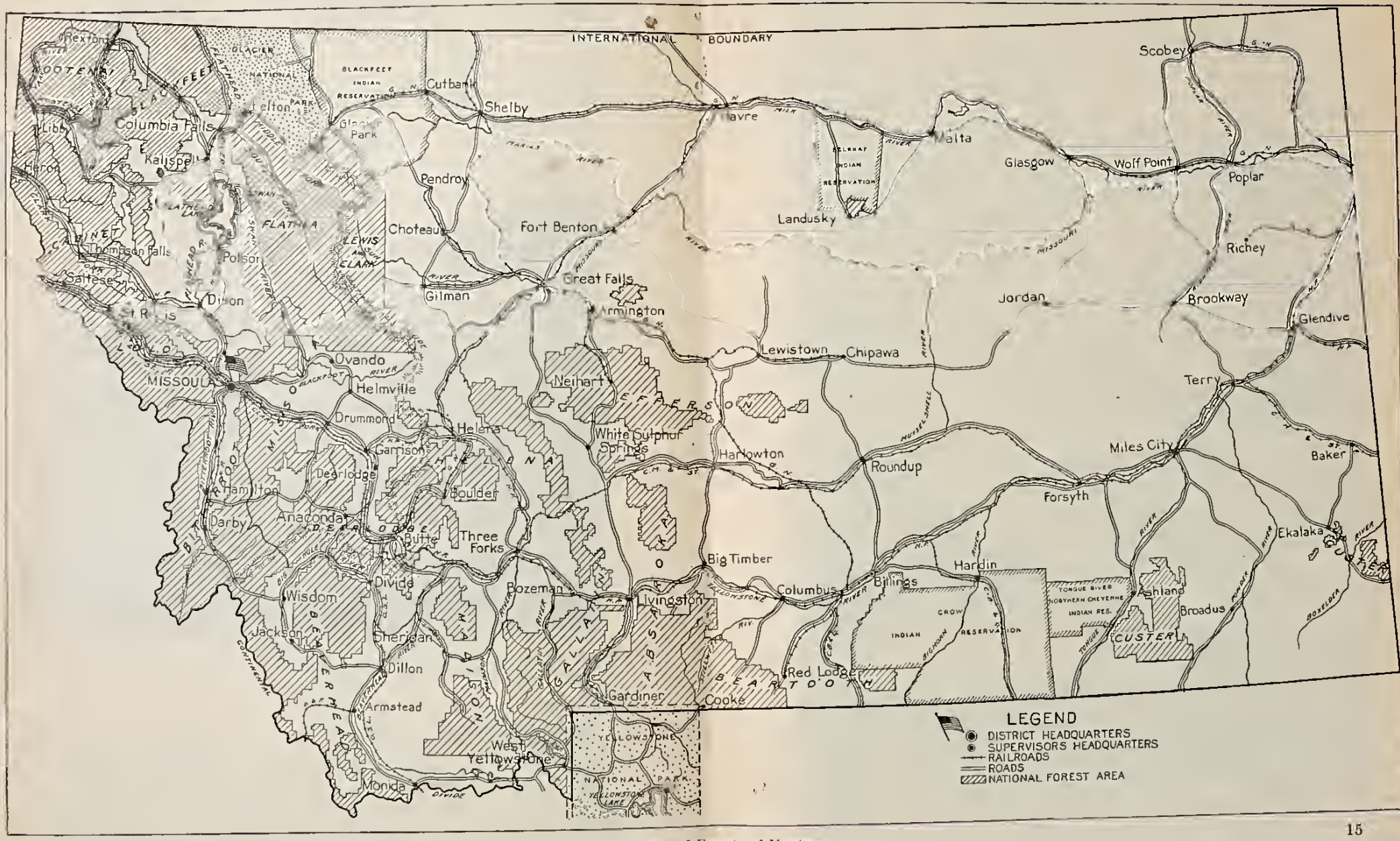
F–150152

FIG. 9.—An irrigation flume, Beaverhead National Forest. Near this point is the site of the Big Hole Battle, fought between Nezperce Indians and soldiers in 1877

Forested watersheds are important to irrigation as well as to water-power projects. The timbered mountain slopes of the national forests, protected as they are from devastation, may be considered as great primary reservoirs. To conserve still further the waters of the mountains, numerous lakes lying in the valleys have been dammed. This form of development is encouraged by the Forest Service policy of putting every resource of the forests to its highest use. The orchards and fields of the famous Bitterroot Valley are watered by streams rising wholly in the great areas of national-forest land which encircle this region. The Sun River reclamation project near Great Falls is entirely dependent for water on the streams rising in the Lewis and Clark National Forest. Many other cases might be cited, but irrigation is so generally dependent


INTERNATIONAL
Rexford
KOOTENAI
BLACKFEET
GLACIER NATIONAL PARK
BLACKFEET INDIAN RESERVATION
Cutbank
Shelby
Belton
Glacier Park
Libby
Columbia Falls
Kalispell
Heron
MARIAS RIVER
Pendroy
FLATHEAD LAKE
FLATHEAD
SWAN
Choteau
Fort Benton
CABINET
Thompson Falls
Polson
LEWIS AND CLARK
Saltese
Great Falls
Gilman
Dixon
St. Regis
Armington
LOLO
Ovando
MISSOULA
BLACKFOOT RIVER
Helmville
Neihart
Drummond
Helena
White Sulphur Springs
Garrison
Deerlodge
Hamilton
Boulder
Darby
Anaconda
DEERLODGE
Butte
Three Forks
Divide
Bozeman
Wisdom
Livingston
Jackson
Sheridan
Dillon
Gardiner
Armstead
West Yellowstone
YELLOWSTONE NATIONAL PARK
YELLOWSTONE LAKE
Monida
DIVIDE
CONTINENTAL


DARY
Scobey
G. N.
POPLAR RIVER
MILK RIVER
Malta
BELKNAP INDIAN RESERVATION
Glasgow
Wolf Point
Poplar
Landusky
MISSOURI RIVER
Richey
REDWATER RIVER
Jordan
Brookway
Glendive
N.P.
Lewistown
Chipawa
Terry
MUSSELSHELL RIVER
Miles City
Baker
Roundup
Forsyth
Ekalaka
CUSTER
Hardin
Billings
Columbus
TONGUE RIVER NORTHERN CHEYENNE INDIAN RES.
Ashland
Broadus
POWDER RIVER
BOXELDER
CROW INDIAN RESERVATION
BIGHORN
TONGUE
Red Lodge
LEGEND
DISTRICT HEADQUARTERS
SUPERVISORS HEADQUARTERS
RAILROADS
ROADS
NATIONAL FOREST AREA



The National Forests of Montana

on water from the wooded mountains of the national forests that these examples may be considered as typical.

The conservation of water by storage in the mountains is also important for municipal water supplies. (Fig. 10.)

MINING

The history of mining in Montana began with the discovery during the summer of 1862 of placer gold in the gravel of Grasshopper Creek, near the present site of Bannock, once the seat of the Territorial government. The news of the discovery soon spread, and with the rush to this new field came the finding of other diggings. Two gold seekers, William Fairweather and Henry Edgar, discovered Alder Gulch, the richest and most extensive deposit of placer gold in the Rockies, if not in the world. Last Chance Gulch, where Helena now stands, Confederate Gulch in Broadwater County, Nelson Gulch, and the Marysville district yielded millions. The exact amount will never be known, since much of the dust was taken out of the country by the gold hunters who returned to the East after making their "stake."

Although Montana heads the list of producers of silver, large quantities of which are taken from copper ores as well as from silver ores, the greatest mining epoch of the State was entered with the discovery of copper in the Anaconda silver mine at Butte in 1883. So valuable was the strike that the plans of the owners were changed, and they decided to erect a smelter instead of a silver mill. Ore was found in seemingly inexhaustible quantities. Marcus Daly built a big smelter at Anaconda, and in a short time the copper produced amounted to millions of pounds. Montana now ranks second in the production of copper, being surpassed only by Arizona.

Montana also holds second place in the production of zinc, and great quantities of lead are taken from zinc and silver ores. The demand for manganese during the war led to the development of extensive deposits of this ore in the Philipsburg and Butte districts. At Yogo, in Judith Basin, is the largest deposit of sapphires in the world. There are between 12 and 15 large, and about 40 small coal mines in Montana, mostly in Carbon and Cascade Counties, and extensive deposits of low-grade coal underlie large areas throughout the eastern part of the State.

The mines of Montana have always depended more or less on the forests for their successful development. In the early days the prospector and miner built flumes and sluices from hand-hewn timber, and arrastras and mills from logs. With the rapid development of the larger mines came a correspondingly increased demand for wood. At one time wood and charcoal were used almost entirely in the smelters at Anaconda and Butte, and millions of cords were cut for this purpose. The amount of wood used for mine timbers at the present time is enormous. Stulls and lagging for tunnels and drifts, converter poles, and mine ties are all a necessity to the industry.

The large mining centers of the State are fortunate in their proximity to national forests. The coal mines of Red Lodge have forests at their very thresholds to draw from. The Butte mines have in the large areas of lodgepole pine in the national forests a

source of supply which can be counted on as a permanent factor in the industry.

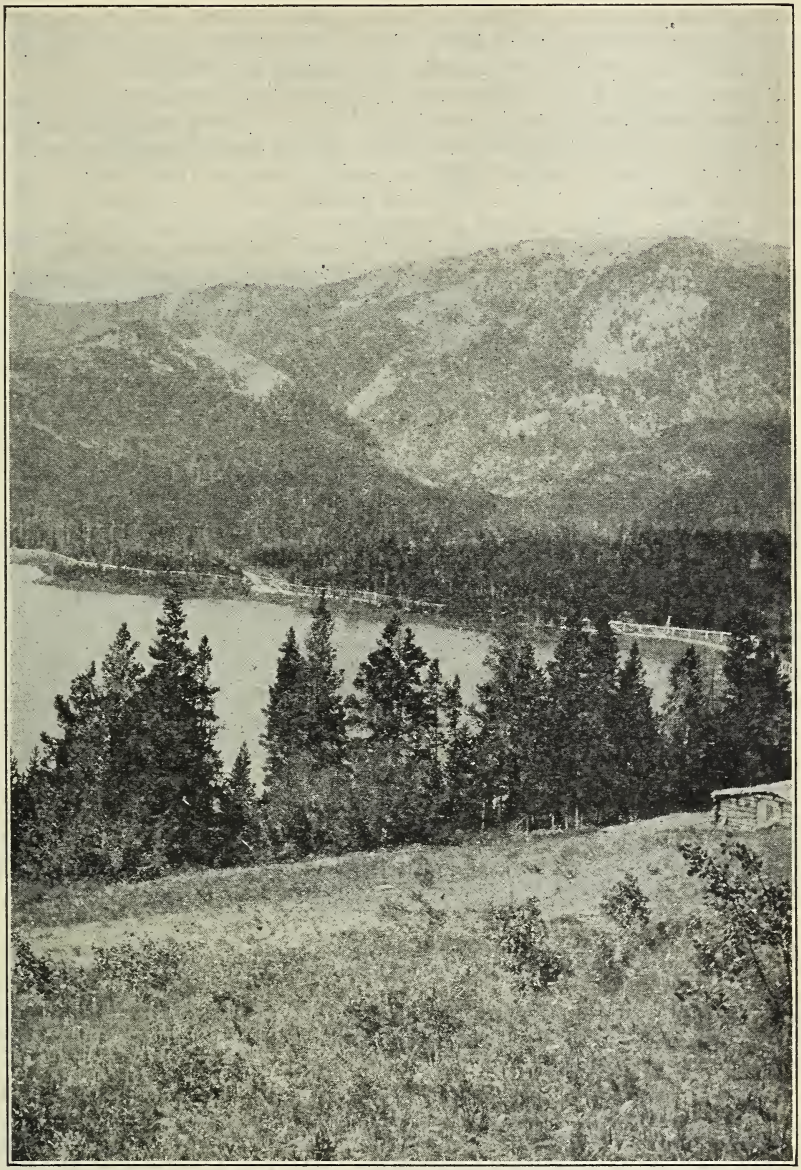
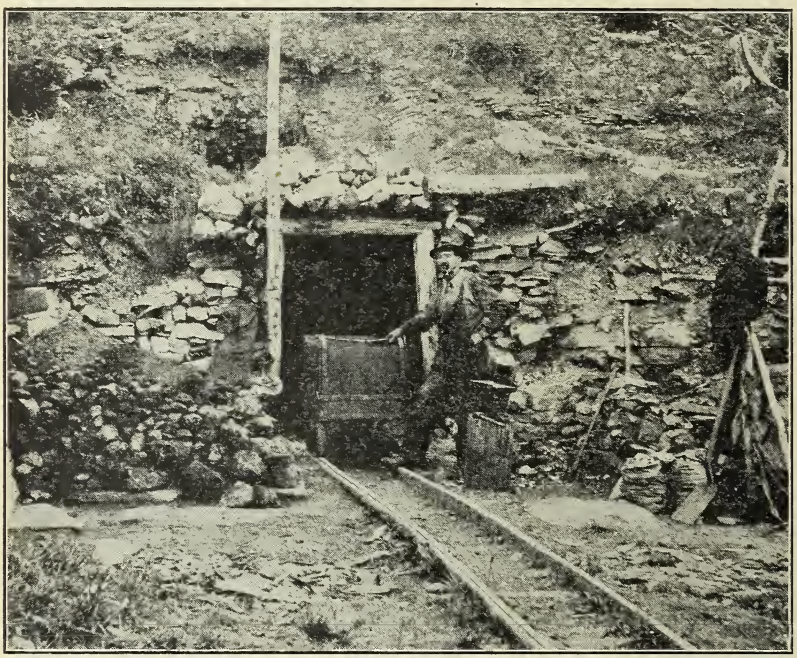


FIG. 10.—Reservoir on the Helena National Forest which supplies water for the capital city of the State

The demand for wood for the operation of the mines and smelters, as well as for fuel, has resulted in many cases in complete destruction of the forests in the immediate vicinity of the large

mining camps. Added to this is the damage caused by smelter fumes. Old-time methods of smelting involved the use of wood and charcoal, both of which admitted of cutting the forests absolutely clean. The deadening of the forests through the use of fire so cheapened the work of cutting that it was customary to keep the fires burning two or three years ahead of cutting operations.

Near Anaconda the timber on thousands and thousands of acres has been entirely killed by smelter fumes. Practically all of this timber that was suitable for use in the mines has been taken out, but utilization is less complete than formerly, because there is no longer need for charcoal. The continued presence of the fumes prevents reproduction. These areas are therefore lost for timber growing.



F-166701

FIG. 11.—A mine tunnel on the Jefferson National Forest. A prospector may stake a claim wherever he finds evidences of valuable minerals

The elements in the smelter fumes that are destructive to trees consist almost entirely of sulphur dioxide and trioxide gases, which are produced in the smelting of sulphide copper ores.

Through improved methods of smelting, the damage to the forests is being somewhat reduced. This, with the prevention of fires through national forest administration, is resulting in bringing some of the land back to forest production. At the same time all clean cutting has been stopped by the Forest Service. The creation of national forests has therefore contributed greatly to the permanence of the near-by timber supply for mining purposes, as well as to stream-flow regulation by keeping a constant forest cover on watersheds.

Mineral deposits within the forests are open to development exactly as on other public land. A prospector may go anywhere and stake a claim wherever he finds evidences of valuable minerals. (Fig. 11.) The policy of the Forest Service is to give the mining man all the help possible. The only restriction is that mining claims must be bona fide ones, and not taken up for the purpose of acquiring valuable timber or a town or power site, or to monopolize the water supply on stock range. Prospectors may use timber on their claims for development purposes free of charge.

RECREATION

Within the past few years has come a great increase in the number of people who are finding recreation in out-of-door pur-

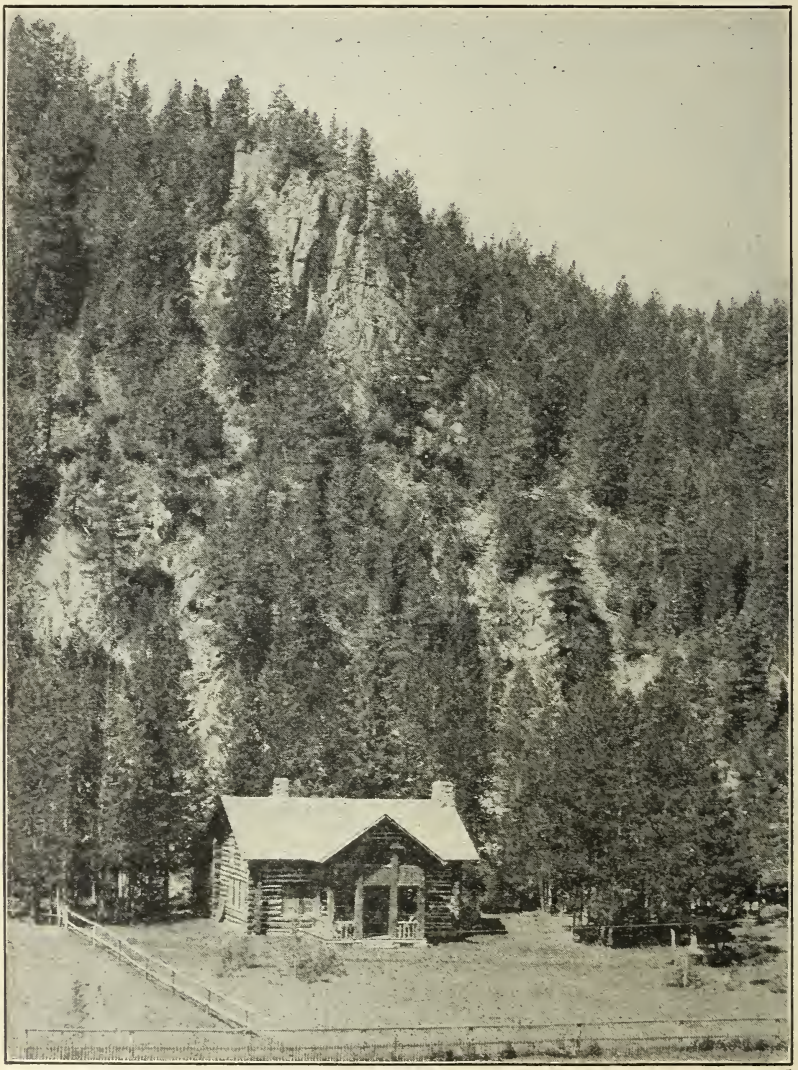
F–158879

FIG. 12.—Boy Scouts at camp on Seeley Lake, Missoula National Forest

suits, such as camping, mountain climbing, camera hunting, and fishing. With the increased use of the automobile, many are finding it possible to explore the country in their own and other States, and automobile tourists from the East are passing by thousands over the main roads of the West.

The national forests offer an infinite variety of country, from rugged mountain peaks and remote wilderness to more accessible regions where one may find good fishing streams, beautiful lakes, and an abundance of camping places. The value of the material resources of these forests can be arrived at with some degree of accuracy but the more intangible values which they hold for the lover of the out-of-doors can never be computed in dollars and cents. (Fig. 12.)

The national forests of the northwestern part of the State (the Blackfeet, Kootenai, and Cabinet) are heavily wooded in parts and contain stretches of primeval forest as beautiful as can be found in the Northwest. The wonderful Turquoise Basin region at the head of Swan River has but recently been explored. The granite peaks and spires of the Bitterroot Mountains are worth a visit by the adventurer who wishes to try his skill on peaks which are seldom scaled. On the Beartooth National Forest is Granite Peak, the highest mountain of the State, with an elevation of 12,875 feet, and the curious Grasshopper Glacier, where may be seen myriads of grasshoppers sealed in the ice, probably since prehistoric times.



F–166685

FIG. 13.—A summer home on Belt Creek, Jefferson National Forest

Few towns in central or western Montana are too far from national-forest areas to prevent people from reaching woods, streams, lakes, and mountains easily. Many obtain permits for summer-home sites from the Forest Service on lakes or streams and put up cabins and cottages (fig. 13.) Seeley Lake, on the Missoula National Forest, has a summer colony formed mostly of citizens of Missoula. Many of the people of Great Falls have leased summer-home sites along Belt Creek on the Jefferson National Forest, and feel amply repaid for an automobile ride of 60 miles by spending a day or so on the banks of a mountain stream. Bozeman is fortunate in having the valley of the West Gallatin River near by, and the Forest Service has been called on to lease many home sites in this

FIG. 14.—Mule or Rocky Mountain black-tail deer. One of the finest game animals of Montana

locality. The Beartooth National Forest satisfies the wants of Billings in this respect and gives the people of that city a place where they may enjoy the out-of-doors.

WILD LIFE

One of the important duties of forest officers is the protection of wild life, as provided for by the State game laws, which apply on the national forests exactly as in other places. (Fig. 14.)

A large herd of elk makes its home within Yellowstone Park near its northern boundary, and during the season of deep snows these animals are driven to feed in the lower country of the adjacent Absaroka and Gallatin National Forests. The Sun River Game Preserve, located on the Lewis and Clark Forest, contains an elk herd estimated at 3,500 animals. Elk are also scattered through the forests of the western part of the State. A favorite

hunting ground for elk is found at the head of the South Fork of the Flathead River; and, notwithstanding the fact that a number are taken each year, the animals seem to be holding their own.

Mountain goats are still found in Montana, and the visitor to the high country of the Flathead or Bitterroot National Forests or along the Continental Divide is seldem disappointed in getting a sight of these interesting creatures. Mountain sheep are sometimes seen at several points in the national forests, chiefly in the Sun River Game Preserve. Although rare, moose are occasionally encountered in the Montana woods, small bunches having been sighted on the Absaroka, Beaverhead, and Missoula National Forests. These animals are all protected at the present time.

Bear are now considered game animals in the State, and can only be taken with a rifle, the older methods of trapping and hunting with dogs being forbidden. The common brown and black bears are plentiful, and grizzlies make their home in the higher rocky country.

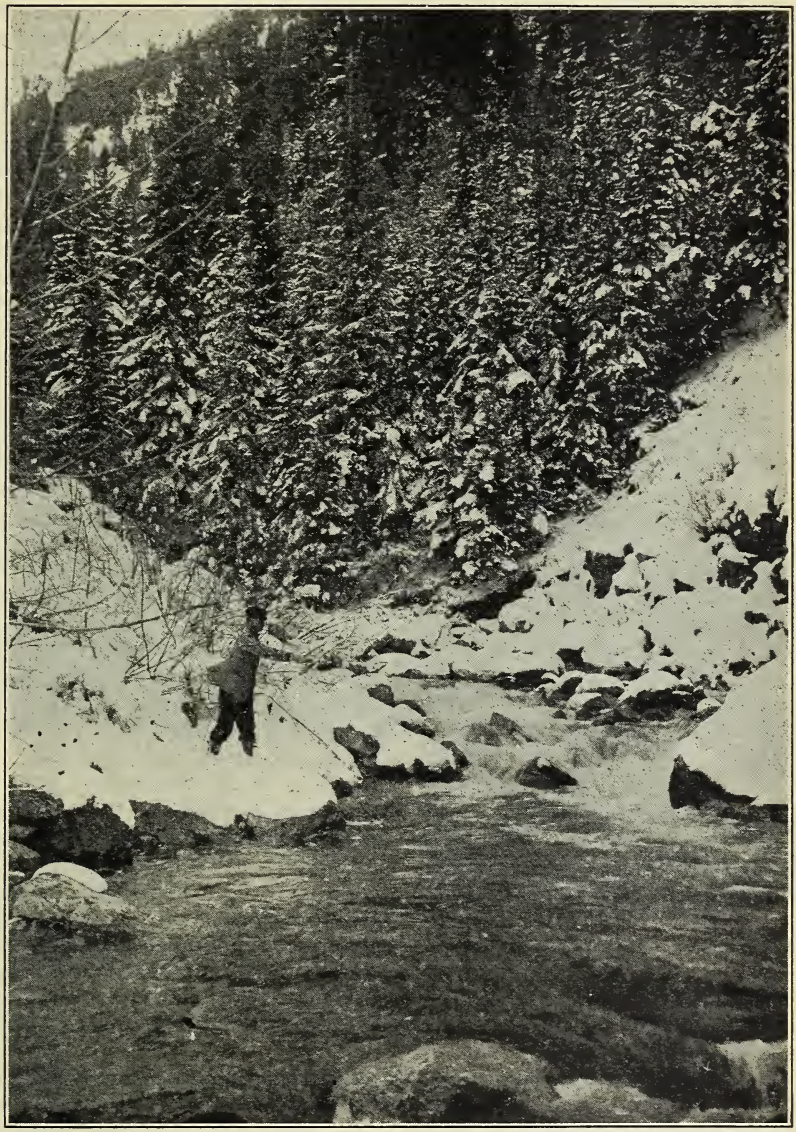
Good fishing streams are found everywhere in the forests of Montana. (Fig. 15.) The Forest Service cooperates with the State and other agencies in planting fish in many of the streams which have been fished out. As the automobile continues to make fishing streams and hunting grounds more accessible, the situation can only be met through a wider and more frequent restocking of streams, regulation of the number of fish that can be taken by each person each day, and strict game law enforcement.

Wild life is a forest resource. It has great value, both economic and æsthetic, to any State or community. The national forests are the natural habitat and shelter for much of the remaining game and wild life, and no plan of forest management is complete that does not take this into account. Through unrestricted or poorly regulated taking of game in the past, the supply has been greatly depleted and in some places almost entirely exterminated. One of the important objects of the Forest Service, therefore, is to build up wild life to the amount which the forests can properly support, at the same time taking into account the need of range for domestic livestock.

The establishment of game refuges where no hunting is allowed is the first step toward accomplishing this end. Careful study is necessary in the selection of these refuges, so as to bring about the best distribution and properly to coordinate game production with the forage needs of domestic livestock. A game-management plan is made for each forest and is being constantly improved and perfected. Forest officers cooperate fully with the State game department. They serve as State game wardens, and the fact that they are always going about through the forests at all seasons of the year has done much toward bringing about game law enforcement. A game census on each forest is a part of the plan. Through education, the public has become more interested and the sentiment in favor of game conservation is growing rapidly. Game and wild life are becoming an increasingly important resource of the national forests, in which, because of her immense forest regions, Montana may well hope to take the lead.

PROTECTION FROM FIRE

Fire has always been a menace to the forests of the Northwest. The season of 1910, when fires in western Montana and northern



F–162490

FIG. 15.—Rattlesnake Creek, Missoula National Forest

Idaho burned more than $24,000,000 worth of timber and caused the death of 78 people, has written into the history of this region one of its most sensational chapters. The traveler over railroad or

highway through western Montana can not fail to notice the great scars left on the mountain slopes by these severe fires. There is a period from the last of June to the first of September when rain is usually very scarce in the State. In some years practically no rain falls from early June until the middle of September. The forest becomes very dry and inflammable, and it often happens that at these times a succession of severe electric storms occurs, bringing an abundance of lightning with little rain to extinguish the fires which are started. These lightning fires are usually set in the high mountain country, often remote from settlements and hard to reach.

Even before the coming of white men, fires took their toll of Montana forests. Of this there is abundant proof in fire scars hidden in the wood of old trees, and charcoal buried in the duff of the forest floor. With the coming of the settlers to Montana the fire hazard gradually increased, because of sparks from locomotives and carelessness of brush burners, campers, and smokers.

F-180140

FIG. 16.—A forest fire lookout cabin

Before the national forests were put under the administration of the Forest Service in 1905, little or no attempt was made to control forest fires on the public domain. They were left to burn unchecked except in cases where buildings or other improvements were threatened. This indifference to timber destruction has disappeared with the growing appreciation of the value of forests and forest products.

The greatest fire danger in Montana is in the heavy stands of timber west of the Continental Divide. A fire burning in the crowns of the trees and driven forward by high wind is a destructive force which can hardly be appreciated without being seen. East of the Continental Divide, where the growth of timber is more open in character, the danger is much less, although great destruction can be caused in the heavy lodge-pole pine forests.

The Forest Service has now developed a comprehensive system of fire protection. During the summer months an extra force of men is employed in protective work. On some of the higher peaks, which command extensive views of the country, lookout men are constantly on the watch for smoke (Fig. 16), which may be likened to a signal of distress. When smoke is discovered its approximate location is at once reported over the telephone to the nearest ranger station. A patrolman, called a "smoke-chaser," starts immediately to investigate and put out the blaze. In case the fire proves to be

too large to be extinguished with the light tools which one man can carry on his back, extra help is assembled, equipped with tools, and sent to the scene.

To reach fires in rough and inaccessible country is sometimes a difficult undertaking. The transportation of supplies must be by pack horses over rough mountain trails (Fig. 17). Effort is always made, however, to send men and equipment as soon as possible, for a fire is easily put out only while it is small.

In fighting fire it is usual to construct a fire line, or trench, by cutting out fallen timber and clearing away the débris and litter down to the mineral soil until a break is formed at which the fire can be held. A line of this kind is patrolled continually to prevent the fire from crossing. Often a high wind will baffle all attempts to check a fire at a line of this kind, and the flames will leap the barrier and make it necessary to build another fire line to surround

FIG. 17.—Pack train transporting lumber for a lookout cabin

the new area. Back-firing is occasionally employed to hold the flames inside the fire line by burning the inflammable material for some distance toward the oncoming blaze. This is a hazardous undertaking at best, and is only practiced under exceptional circumstances or as a last resort.

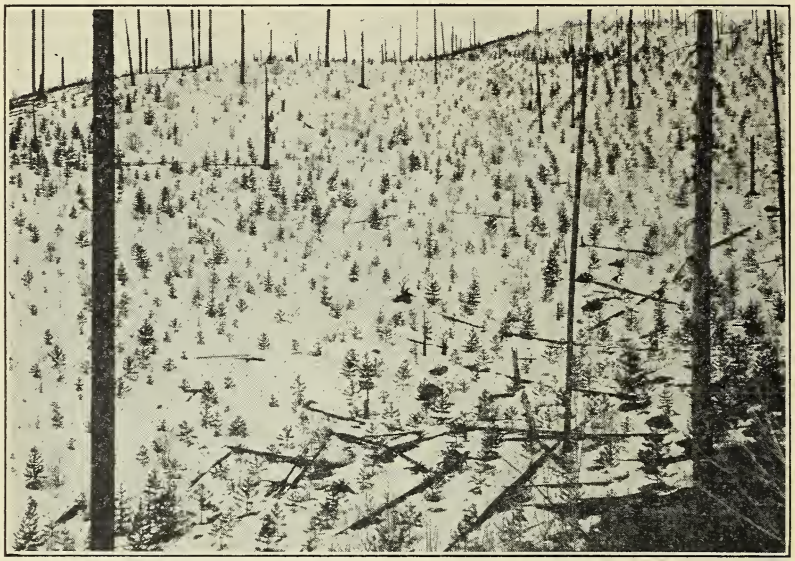
Private owners, realizing that it is to their interest to protect their investments in timber and cut-over lands, have in many cases organized timber protective associations or cooperative agencies for detecting and extinguishing fires. The cost of patrolling and fire fighting is paid out of a common fund provided by the assessment of each owner according to the number of acres he holds. There are two such organizations in Montana at the present time.

Grass fires are common in the open yellow-pine forests of eastern Montana. Valuable cattle range may be destroyed by such fires or areas of young trees wiped out. The damage is small, however, in contrast to the destruction caused by a bad fire in the heavy stands west of the Divide.

FOREST PLANTING

The largest Government nursery for the growing of forest trees in the United States is located near Haugan, a small town on the Yellowstone Trail in western Montana. This is known as the Savenac Nursery, because of its location at the mouth of Savenac Creek, a tributary of the St. Regis River. Here are growing at all times about 10,000,000 small trees of timber-producing species, such as western white and western yellow pines, spruce, and fir.

These trees are not for sale, but are used for replanting lands devastated by forest fires (fig. 18). Fires have taken a heavy toll



F–173786

FIG. 18.—Plantation of yellow pine on the Lolo National Forest

from the forests west of the Continental Divide. The severe fires which occurred during the dry summer of 1910 left many mountain slopes denuded of all vegetation. On such lands tree growth is slow in starting, or what does start represents the poorer species, such as lodgepole pine, rather than more desirable timber. On land of this kind seedlings can be successfully and profitably planted.

The cost for each tree is very small—about 1½ cents covers everything from the seed to the time the young tree is finally set out on the planting site. It is estimated that it will take about 120 years for the small trees to reach maturity.

One thousand pounds of seed a year are required to raise the trees in this nursery. The Forest Service superintends the collection of cones, dries them, and extracts the seed in special machinery designed for the purpose. After growing in the nursery beds for two or three years the little trees are taken up for final planting on the sites where they are needed. They are spaced 8 feet apart each way, so that 680 trees are required for an acre. Western yellow pine is the species

most successfully grown in this region, as it will adapt itself to a great variety of locations and when once established has few enemies and makes rapid growth.

REVENUE FROM THE NATIONAL FORESTS

In addition to receipts from timber sales and grazing permits on the national forests, considerable revenue is derived from sites leased for summer homes and for such establishments as hotels, stores, or stage stations. No charge is made for permits for school-building sites, reservoir conduits, roads, trails, or telephone lines. As greater use is made of the resources of the forests, revenues will increase proportionately.

To the counties containing areas of national forest land, 25 per cent of the revenue obtained from such areas is turned over for road

F–150141

FIG. 19.—Big Hole Road, Bitterroot National Forest

and school purposes. To January 1, 1924, $1,278,000 had been given to Montana counties which have national-forest areas within their boundaries.

In addition, 10 per cent of forest revenue is set aside for the purpose of building roads and trails in the national forests. These improvements are of direct benefit to people traveling in sparsely settled regions in or near the national forests. (Fig. 19.)

Congress has directly appropriated about $2,000,000 for the construction of roads needed for public travel within and adjacent to the national forests of Montana. During the past three years about $800,000 was allotted for roads and trails needed primarily for protecting, developing, and administering the forests. From this fund a system of roads and trails is being constructed into areas of valuable timber, so that men with supplies and fire-fighting equipment can get to fires quickly.

SIX RULES FOR PREVENTING FIRE IN THE FORESTS

1. Matches.—Be sure your match is out. Break it in two before you throw it away.

2. Tobacco.—Be sure that pipe ashes and cigar or cigarette stubs are dead before throwing them away. Never throw them into brush, leaves, or needles.

3. Making Camp.—Before building a fire scrape away all inflammable material from a spot 5 feet in diameter. Dig a hole in the center and in it build your fire. Keep your fire small. Never build it against trees or logs or near brush.

4. Breaking Camp.—Never break camp until your fire is out—dead out.

5. Brush Burning.—Never burn slash or brush in windy weather or while there is the slightest danger that the fire will get away.

6. How to Put Out a Camp Fire.—Stir the coals while soaking them with water. Turn small sticks and drench both sides. Wet the ground around the fire. If you can't get water stir in dirt and tread it down until packed tight over and around the fire. Be sure the last spark is dead.

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
10 CENTS PER COPY

▽